

## MULTIPASS CAVITY FOR ILLUMINATION AND EXCITATION OF MOVING OBJECTS

### Abstract of the Disclosure

5 An illumination system for increasing a light signal from an object passing  
through a reflection cavity. The reflection cavity is disposed between  
spaced-apart, opposed first and second surfaces disposed on opposite sides of a  
moving stream of objects. A light collection system is disposed substantially  
orthogonal to a plane passing through the surfaces and the stream so as to collect  
light that is scattered from or emitted by the objects as they pass through a field of  
10 view disposed between the first and second surfaces. A beam of light from a laser  
source is directed through the stream of moving objects in a direction nearly  
orthogonal to the stream (but slightly inclined) and lying in the plane that extends  
through the surfaces and the stream. Due to the reflection angle and the distance  
between the stream and the first surface, the point at which the light reflected  
15 from the first surface intersects the stream on a second pass is displaced from  
where it passed through the stream on its initial pass. The light is reflected back  
and forth between the surfaces a plurality of times, illuminating a different portion  
of the field of view with each pass until, having ranged over the field of view, the  
light exits the reflection cavity. The "recycling" of the light beam in this manner  
20 substantially improves the SNR of the detection system by increasing an average  
illumination intensity experienced by the objects in the stream.